

PRELIMINARY ENERGY ASSESSMENT

for

CITY OF IRVING

801 W. IRVING BLVD
IRVING, TX 75060



Provided By:
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1.0 EXECUTIVE SUMMARY

A Preliminary Energy Assessment (PEA) site visit for the City of Irving was conducted during the month of April 2009 for the purpose of identifying viable Energy Conservation Measures (ECMs). This report documents that investigation.

This service is provided by Jacobs at no cost to the City of Irving by the Texas Comptroller of Public Accounts, State Energy Conservation Office (SECO). This program promotes and encourages an active partnership between SECO and local political subdivisions for the purpose of planning, funding, and implementing cost-effective, energy conservation measures allowing for the reduction in electric consumption of existing facilities ultimately reducing facility energy bills and regional emissions.

The following ECMs were investigated and recommended for implementation or further detailed analysis:

ECM 1: Civic Center – Lighting Retrofit

ECM 2: Civic Center – VFDs on Cooling Tower Motors

ECM 3: Central Library – Lighting Retrofits

ECM 4: Central Library – VFD on Chilled Water Pumps

ECM 5: ICTN – DX Replacement

ECM 6: Senter Park Rec Center – Lighting Retrofit

ECM 7: Senter Park Rec Center – DX Replacement

ECM 8: Senter Park Rec Center – Install Programmable Thermostats

A preliminary energy and cost savings evaluation was conducted on each recommended measure listed above. Descriptions of these measures and a summary of each evaluation are presented in the following sections. An overall summary of the results is presented in Table 6.1. Each proposed utility evaluation was based on the prevalent utility costs at the time of the audit.

As seen in Table 6.1, the recommended measures provide for a combined estimated annual savings of \$61,824, with an estimated capital requirement of \$414,959 thus yielding a composite simple payback period of 7.0 years. Overall, it is estimated that by implementing these measures, electric utility consumption, in the buildings surveyed, can be reduced by 7.7%.

Descriptions and calculations for the recommended measures can be found within this report. A follow-up visit can be scheduled to address questions regarding the report, project financing options, implementation schedules, or any other aspect of this program or its implementation.

SECO is committed to providing whatever assistance is required in planning, funding, and implementing the recommendations of this report. The City of Irving is encouraged to direct any questions or concerns to either of the following:

SECO
Stephen Ross
1-800-531-5441, ext 3-1896



Jacobs
Stephen Van De Kieft
817-735-6024

Included in the appendix of this report is also a list of websites that can be utilized in learning more about SECO, Senate Bill 12, various funding solutions, energy saving projects, and various state and federal agency services and programs.

2.0 OBJECTIVE

The objective of this Preliminary Energy Assessment (PEA) is to identify potential economically viable measures for achieving electrical energy savings. The PEA includes an estimated energy performance assessment, identification of potentially cost effective capital projects, energy saving maintenance and operation recommendations, and identification of potential funding sources.

3.0 FACILITY DESCRIPTION

The City of Irving owns and operates many buildings within the city limits; however, this PEA was limited to five buildings that were agreed upon by the City of Irving and Jacobs Engineering.

3.01 Civic Center Building

The Civic Center is located at 825 W. Irving Blvd. The facility consists of a three story building and parking garage. The facility is approximately 107,910 square feet and was originally built in 1976 and renovated in 2000. The building's exterior walls are stucco, windows are double paned, and the roof is polymer modified coal tar coat and gravel.

The lighting fixtures in the building utilize T-12 lamps with magnetic ballasts, but the maintenance staff is in the process of converting to T-8 lamps with electronic ballasts as the T-12's are ready for replacement. Based on conversations with the maintenance staff and a recent walkthrough of the facility, it appears that approximately 40% of the buildings lighting fixtures currently still utilize T-12 lamps. The remaining T-12 systems are not as efficient as the T-8 systems and are candidates for replacement.

Chilled water is produced by two 250-ton Carrier 19XR water-cooled hermetic centrifugal chillers which are 9 years old. Chilled water pumping is arranged in a primary/secondary system, with two common headered constant speed 7.5-hp primary pumps serving the chillers and two 50-hp variable speed secondary chilled water pumps circulating water within the building. There are two Evapco cooling towers with stainless steel basins, each with a 10 hp constant volume fan and constant volume condenser water pumps.

Hydronic hot water is produced by four 1.26 MBH Lochinvar gas-fired hot water boilers with constant volume pumps which are located in the penthouse.

The building's air system consists of eight Carrier air handling units (AHUs) which are original to the building, but have since been updated with variable frequency drives (VFDs). There are 153 Enviro-tec fan powered variable air volume (VAV) boxes.

The building is controlled by a direct digital control (DDC) energy management system (EMS), but lighting is not included with these controls.

The air conditioning is operated 7 days a week from 5:30 a.m. to 10:30 p.m. Typical occupancy for the building is from 8:00 am to 10:30 pm on weekdays.

3.02 Central Library

The Central Library is located at 801 W. Irving Blvd. The facility is three stories, approximately 110,000 square feet, and was originally built in 1984. The building's exterior walls are stucco, windows are double paned, and has a built up roof.

The lighting fixtures in the building utilize T-12 lamps with magnetic ballasts, but the maintenance staff is in the process of converting to T-8 lamps with electronic ballasts as the T-12's are ready for replacement. Based on conversations with the maintenance staff and a recent walkthrough of the facility, it appears that approximately 66% of the building's lighting fixtures currently still utilize T-12 lamps. The remaining T-12 systems are not as efficient as the T-8 systems and are candidates for replacement.

Chilled water is produced by two 200-ton Carrier water-cooled hermetic centrifugal chillers which are located in the building's basement. There are two constant volume 15-hp chilled water pumps, two constant volume 20-hp condenser water pumps, and a backup 20-hp pump. There is an Evapco cooling tower with a stainless steel basin located on the roof with a variable speed fan which was added in 2007.

Hydronic hot water is produced by two 2.0 MBH Lochinvar gas-fired hot water boilers which were added in 2004 and two 5-hp constant volume pumps circulate the water within the building.

The building's air system consists of seven Carrier AHUs. Only two of these units contain VFDs.

The building uses pneumatic controls which have been problematic. There are constant air leaks and the system's clock does not work properly.

The air conditioning is operated 24 hours a day, 7 days a week with no setback.

3.03 Fire Administration & Purchasing Building

The Fire Administration & Purchasing Building is located at 845 W. Irving Blvd. It is a two story building of approximately 21,000 square feet which was built in the 1950's. The exterior walls were renovated in 1999 with stucco over brick, and a mop-down modified roof.

The lighting fixtures in the building utilize compact fluorescents and T-8 lamps with electric ballasts.

Chilled water for this facility is produced by a single 66-ton York air cooled chiller which is located on the side of the building and was added in 1999.

The building's air system consists of two York AHUs, both containing VFDs. There are 28 Enviro-tec fan powered VAV boxes.

The building is controlled by a direct digital control (DDC) energy management system (EMS).

The air conditioning is operated 24 hours a day, 7 days a week.

3.04 ICTN Building

The ICTN is located at 233 S Rogers Rd. It is a two story building of approximately 14,886 square feet. The exterior walls are stucco and it has a tar roof.

The lighting fixtures in the building utilize T-8 lamps with electric ballasts and compact fluorescents.

The building space conditions are maintained by nine packaged DX systems and five split DX systems. All units are located on the roof with the exception of one condensing unit located on the side of the building. They are controlled by both programmable thermostats and manual thermostats.

Typical occupancy for the building is from 8:00 am to 6:00 pm on weekdays.

3.05 Senter Park Rec Center

The Senter Park Rec Center is located at 901 S. Senter Road. It is a two story building of approximately 28,130 square feet which was built in 1954. The exterior walls are brick and the roof is SBS modified bitumen.

The lighting fixtures in the building utilize T-12 lamps with magnetic ballasts, FBO31/830 lamps, and gym lighting fixtures that utilize metal halide lamps.

The building space conditions are maintained by both split DX systems and packaged DX units. The building is controlled by manual thermostats.

Hours of operation are from 9:00 a.m. to 10:00 p.m. on Monday through Friday, 9:00 a.m. to 5:00 p.m. on Saturday, and 1:00 p.m. to 5:00 p.m. on Sunday.

4.0 CURRENT ENERGY AND COST PERFORMANCE

Based on current utility data, the City of Irving buildings have the following annual electric costs for the months of October 2007 to September 2008.

Table 4.1— Utility Usage		
Buildings	Annual Electric Consumption	Annual Cost
Civic Center	3,396,016	\$372,838
Central Library	2,338,380	\$249,395
Fire Admin	503,441	\$54,571
ICTN	351,024	\$40,170
Senter Park Rec Center	631,080	\$79,314
Total	7,219,941	\$796,288

The utility data collected can be found in Appendix A.

Energy Use Index (EUI) and Energy Cost Index (ECI) are summarized below based on the total gross area for each facility surveyed:

Table 4.2—Energy Use and Energy Cost Indices			
Buildings	Total Area (ft ²)	EUI (BTU/ ft ² /yr)	ECI (\$/ft ² /yr)
Civic Center	107,910	107,378*	\$3.46*
Central Library	110,000	72,532	\$2.27
Fire Admin	21,000	81,797	\$2.60
ICTN	14,886	80,458	\$2.70
Senter Park Rec Center	28,130	76,546	\$2.82

*The EUI and ECI numbers appear to be high for the Civic Center due to the fact that the electricity bills for this building included the adjacent parking garage. A detailed audit of the parking garage could yield additional cost savings.

The EUI, an estimate of the energy consumption performance, is measured as BTU's per square foot per year. Likewise, the ECI, an estimate of the energy cost performance, is measured in dollars per square foot per year.

5.0 RESULTS SUMMARY

The recommended measures provide for a combined estimated annual savings of \$61,824 with an estimated capital requirement of \$414,959 thus yielding a composite simple payback period of 7.0 years. Overall it is estimated that by implementing these measure, the electric utility consumption can be reduced by 7.7%.

These reductions in utility usage equate to an annual reduction in emissions equivalent to:

655,290 pounds of CO₂
762,479 grams of NO_x
1,226,597 grams of SO₂

These reductions equate to taking 66 cars off the local streets, saving 90 acres of planted trees, or providing annual electricity to 55 American homes.

Additional details including descriptions, calculations, and estimated savings for each measure can be found in the following sections.

6.0 RECOMMENDED ENERGY CONSERVATION MEASURES (ECMs)

The technical assessment of facility improvements that will ultimately lower the operating cost of the facilities is based on Energy Conservation Measures, or ECMs. An ECM can be anything from equipment replacement to operational policy changes and can have widely variable implementation costs. Not all ECMs have merit under all circumstances, though there is a standard list of ECMs that is worth evaluating for most building types. As mentioned before, the intent of this preliminary assessment is to determine and explain economically feasible ECMs that might have merit in terms of energy savings and ultimately lower operation expenses. In an attempt to identify potential ECMs, some of the following energy conservation strategies were considered:

- Reduce the overall cooling or heating load.
- Reduce the operating hours of energy consuming equipment.
- Increase the efficiency of energy consuming equipment.
- Reduce the connected utility load of the facility.
- Reduce peak utility demand by shifting utility usage to off-peak hours.

A summary of the recommended ECMs is provided in Table 6.1. Details including brief descriptions, calculations, and estimated savings for each ECM can be found in the following pages. Additional ECMs may be identified with a detailed analysis.

Table 6.1—Summary of Projected Energy Conservation Measures						
Meas. No.	Measure Description	Electric Savings (kWh/yr)	Electric Demand Savings (kW/yr)	Utility Cost Savings (\$/yr)	Capital Cost (\$)	Simple Payback (yrs)
1	Civic Center – Lighting Retrofit	117,661	43.7	\$12,943	\$69,300	5.4
2	Civic Center – VFDs on Cooling Tower Motors	78,287	9.0	\$8,612	\$17,178	2.0
3	Central Library – Lighting Retrofit	159,818	59.3	\$17,101	\$108,900	6.4
4	Central Library – VFD on Chilled Water Pumps	69,921	8.0	\$7,482	\$54,113	7.2
5	ICTN – DX Replacement	24,162	30.7	\$2,764	\$37,440	13.5
6	Senter Rec Park Center – Lighting Retrofit	33,487	11.6	\$4,219	\$25,362	6.0
7	Senter Park Rec Center – DX Replacement	45,389	41.3	\$5,705	\$98,130	17.5
8	Senter Park Rec Center – Install Programmable Thermostats	23,796	9.4	\$2,998	\$4,536	1.5
	Total	552,521	213.0	\$61,824	\$414,959	7.0

For each building, Jacobs used a blended electric rate developed from bills gathered from October 2007 to September 2008 to generate dollar savings associated with each ECM.

6.01 ECM 1: Civic Center – Lighting Retrofits

Summary Data:

Electric Energy Savings.....	117,661 kWh/yr
Electric Demand Savings	43.7 kW/yr
Natural Gas Savings.....	N/A
Water Savings	N/A
Utility Cost Savings.....	\$12,943 /yr
Estimated O&M Savings	N/A
Estimated Implementation Cost.....	\$69,300
Simple Payback	5.4 yrs

ECM Description:

This ECM calls for the replacement of all T-12 lamps and magnetic ballasts with T-8 lamps and electronic ballasts throughout the building, and the replacement of incandescent lights with compact fluorescents. The T-12 fluorescent lighting technology and incandescent lights are outdated and use more energy than T-8 fluorescent lighting technology and compact fluorescent lights for the same light output. In addition to reduction in energy required for lighting, heat load to the space is reduced thus reducing energy required for cooling.

Recommendation:

It is recommended that all T-12 fluorescent lights with magnetic ballasts be replaced with T-8 fluorescent lights with electronic ballasts and that all incandescent lights be replaced with compact fluorescent lights. The estimated \$12,943 /year electric savings will pay for the project implementation costs in 5.4 years.

Calculations:

Refer to Appendix for detailed calculations.

6.02 ECM 2: Civic Center – VFDs on Cooling Tower Motors

Summary Data:

Electric Energy Savings.....	78,287 kWh/yr
Electric Demand Savings	9 kW/yr
Natural Gas Savings.....	N/A
Water Savings	N/A
Utility Cost Savings.....	\$8,612 /yr
Estimated O&M Savings	N/A
Estimated Implementation Cost.....	\$17,178
Simple Payback	2.0 yrs

ECM Description:

The Civic Center currently utilizes constant speed fan motors for the cooling tower. Installing variable frequency drives (VFDs) on the fan motors with appropriate controls would allow the fan to modulate its speed as building cooling demand varies throughout the day. The resulting fan energy consumption would be reduced resulting in energy cost savings. This analysis assumes existing motors are compatible with VFDs. Additional modifications may be discovered in a detailed audit.

Recommendation:

This ECM results in considerable fan energy savings potential. A detailed audit would be required to accurately quantify all the savings and costs associated with this ECM. It is recommended that a detailed analysis be completed before the City of Irving moves forward with this conversion. The estimated \$8,612 per year electric savings will pay for the project implementation costs in 2.0 years.

Calculations:

Refer to Appendix for detailed calculations.

6.03 ECM 3: Central Library – Lighting Retrofits

Summary Data:

Electric Energy Savings.....	159,818 kWh/yr
Electric Demand Savings	59.3 kW/yr
Natural Gas Savings.....	N/A
Water Savings	N/A
Utility Cost Savings.....	\$17,101 /yr
Estimated O&M Savings	N/A
Estimated Implementation Cost.....	\$108,900
Simple Payback	6.4 yrs

ECM Description:

This ECM calls for the replacement of all T-12 lamps and magnetic ballasts with T-8 lamps and electronic ballasts throughout the building. T-12 lighting technologies are outdated and use more energy than T-8 fluorescent lighting technologies for the same light output. This ECM also calls for the replacement of incandescent flood lamps with compact fluorescent fixtures. In addition to reduction in energy required for lighting, heat load to the space is reduced thus reducing energy required for cooling.

Recommendation:

It is recommended that all T-12 lamps and magnetic ballasts be replaced with T-8 lamps and electronic ballasts, as well as all incandescent fixtures with compact fluorescent ones. The estimated \$17,101 per year electric savings will pay for the project implementation costs in 6.4 years.

Calculations:

Refer to Appendix for detailed calculations.

6.04 ECM 4: Central Library – VFD on Chilled Water Pumps

Summary Data:

Electric Energy Savings.....	69,921 kWh/yr
Electric Demand Savings	8 kW/yr
Natural Gas Savings.....	N/A
Water Savings	N/A
Utility Cost Savings.....	\$7,482 /yr
Estimated O&M Savings	N/A
Estimated Implementation Cost.....	\$54,113
Simple Payback	7.2 yrs

ECM Description:

The Central Library currently utilizes constant volume chilled water pumping. Installing a variable frequency drive (VFD) on the chilled water pumps and 2-way valves on the air handlers with appropriate controls would allow the pump motors to modulate pump flow as building cooling demand varies throughout the day. The resulting pump energy consumption would be reduced resulting in energy cost savings. This analysis assumes existing motors are compatible with VFDs and that the chillers are able to handle variable chilled water flow. Additional modifications may be discovered in a detailed audit.

Recommendation:

This ECM results in considerable pumping energy savings potential. A detailed audit would be required to accurately quantify all the savings and costs associated with this ECM. It is recommended that a detailed analysis be completed before the City of Irving moves forward with this conversion. The estimated \$7,482 per year electric savings will pay for the project implementation costs in 7.2 years.

Calculations:

Refer to Appendix for detailed calculations.

6.05 ECM 5: ICTN – DX Replacement

Summary Data:

Electric Energy Savings.....	24,162 kWh/yr
Electric Demand Savings	30.7 kW/yr
Natural Gas Savings.....	N/A
Water Savings	N/A
Utility Cost Savings.....	\$2,764 /yr
Estimated O&M Savings	N/A
Estimated Implementation Cost.....	\$37,440
Simple Payback	13.5 yrs

ECM Description:

This ECM involves replacing two packaged DX units with new, more efficient equipment. The existing units are 27 years old and have reached the end of their useful life. Replacing the units, which are inefficient by today's standards, will result in reduced electric energy consumption, lower utility bills, and improved maintenance costs (not captured in pay back calculations).

Recommendation:

Further investigation is recommended for the replacement of the packaged units with new units that have a minimum SEER of 13. This retrofit saves an estimated \$2,764 per year in electric bills and has an estimated simple payback of 13.5 years. Reduced maintenance cost and the consideration of higher efficiency equipment were not included in this calculation. Both of these factors will contribute to a quicker payback.

Calculations:

Refer to Appendix for detailed calculations.

6.06 ECM 6: Senter Park Rec Center – Lighting Retrofit

Summary Data:

Electric Energy Savings.....	33,487 kWh/yr
Electric Demand Savings	11.6 kW/yr
Natural Gas Savings.....	N/A
Water Savings	N/A
Utility Cost Savings.....	\$4,219 /yr
Estimated O&M Savings	N/A
Estimated Implementation Cost.....	\$25,362
Simple Payback	6.0 yrs

ECM Description:

This ECM calls for the replacement of all T-12 lamps and magnetic ballasts with T-8 lamps and electronic ballasts. In the gymnasium area all metal halide fixtures should be replaced with T-5 lamps and electronic ballasts. In addition to reduction in energy required for lighting, heat load to the space is reduced thus reducing energy required for cooling.

Recommendation:

It is recommended that all metal halide fixtures be replaced with T-5 lamps and electronic ballasts and all T-12 fluorescent lights with magnetic ballasts be replaced with T-8 fluorescent lights with electronic ballasts. The estimated \$4,219 per year electric savings will pay for the project implementation costs in 6.0 years.

Calculations:

Refer to Appendix for detailed calculations.

6.07 ECM 7: Senter Park Rec Center – DX Replacement

Summary Data:

Electric Energy Savings.....	45,389 kWh/yr
Electric Demand Savings	41.3 kW/yr
Natural Gas Savings.....	N/A
Water Savings	N/A
Utility Cost Savings.....	\$5,705 /yr
Estimated O&M Savings	N/A
Estimated Implementation Cost.....	\$98,130
Simple Payback	17.2 yrs

ECM Description:

This ECM involves replacing nine packaged units and five small split system units with new, more efficient equipment. Most of the existing units are nearly 20 years old and have reached the end of their useful life. Replacing the units, which are inefficient by today's standards, will result in reduced electric energy consumption, lower utility bills, and improved maintenance costs (not captured in pay back calculations).

Recommendation:

Further investigation is recommended for the replacement of the packaged and split system units with new units that have a minimum SEER of 13. This retrofit saves an estimated \$5,705 per year in electric bills and has an estimated simple payback of 17.2 years. Reduced maintenance cost and the consideration of higher efficiency equipment were not included in this calculation. Both of these factors will contribute to a quicker payback.

Calculations:

Refer to Appendix for detailed calculations.

6.08 ECM 8: Senter Park Rec Center – Install Programmable Thermostats

Summary Data:

Electric Energy Savings.....	23,796 kWh/yr
Electric Demand Savings	9.4 kW/yr
Natural Gas Savings.....	N/A
Water Savings	N/A
Utility Cost Savings.....	\$2,998 /yr
Estimated O&M Savings	N/A
Estimated Implementation Cost.....	\$4,536
Simple Payback	1.5 yrs

ECM Description:

The existing thermostats in the building will be replaced with programmable thermostats. Each thermostat will be programmed to maintain a fixed temperature during the occupied periods each day. In the evening, the temperature will be maintained higher or lower than during hours of occupancy (depending on whether it is the cooling or heating season, respectively). This will conserve energy and increase the lifespan of the equipment.

Recommendation:

It is recommended that all manual thermostats be replaced by programmable thermostats. The estimated \$2,998 per year electric savings will pay for the project implementation costs in 1.5 years.

Calculations:

Refer to Appendix for detailed calculations.

7.0 RECOMMENDED FACILITY IMPROVEMENT MEASURES (FIMs)

Measures or projects that have little or no energy savings but may provide significant operational and maintenance savings or significant facility improvement are provided in this portion of the PEA and are listed as Facility Improvement Measures, or FIMs. Similar to an ECM, an FIM can be anything from equipment replacement to operational policy changes. In identifying potential FIMs, the following strategies were considered:

- Improve operational efficiency.
- Improve maintenance effectiveness.
- Improve employee work environment.
- Provide means of tracking progress.

7.01 FIM 1: Civic Center – Outside Air Economizer

The Civic Center currently has a limited amount of outside air available which prevents it from being able to take advantage of free cooling when lower ambient temperatures are present. It is recommended that the City of Irving further investigates the opportunity to increase the amount of outside air available to this facility in order to lower energy consumption when free cooling could be available.

7.02 FIM 2: Central Library – Convert Pneumatic Control System to Electronic

The Central Library currently has a pneumatic building control system. These controls are outdated and have had many leaks and require frequent maintenance repair. It is recommended that the building control system be updated to more efficient electronic controls. This will also allow for better utilization of the existing direct digital control (DDC) system which is currently not functioning properly.

8.0 NON-TRADITIONAL FUNDING METHODS

When traditional means of funding projects are not available, non-traditional funding may be desirable in order to implement beneficial projects. Energy and operational cost savings can be used to fund projects such as the ones recommended in this report. A couple of options are available when considering funding projects with cost savings.

The first way would be to secure a low interest loan and fund the projects internally by “fixing” the operational budgets over the term of the loan and use the savings to pay back the loan. Low interest loans are available through the State’s Texas LoanSTAR (Saving Taxes and Resources) Program.

The LoanSTAR Program has served as a national model for state and federal loan programs for energy efficiency retrofits, and is SECO's most highly visible program. Legislatively mandated to be funded at a minimum of \$95 million at all times, to date the LoanSTAR Program has saved Texas taxpayers over \$250 million through energy efficiency projects, financed for state agencies, institutions of higher education, school districts, and local governments. The program's revolving loan mechanism allows borrowers to repay loans through the stream-of-cost savings generated by the funded projects. The program will fund energy saving projects with a maximum combined simple payback of 10 years.

Currently the interest rate for all new loans funded from now until 8/31/2009 is set at 3% APR. The interest rate for the LoanSTAR Program is based on several factors which include money market rates and LoanSTAR administrative cost. Rates are evaluated and set every fiscal year, from 9/01 - 8/31.

In order to qualify for funding from the LoanSTAR Program, a detailed energy audit or energy assessment report (EAR) must be completed for the facility/department by a licensed professional engineer in the State of Texas. The purpose of the EAR is to validate the savings estimated in this PEA, through a very detailed approach, as well as confirm the scope of work required for each project.

To assure the borrower that projects are constructed according to the EAR and LoanSTAR technical guidelines, SECO performs design specification review and on-site construction monitoring at 50% and 100% complete.

Another non-traditional solution to funding these projects is to secure the services of a performance contractor. Performance contractors can finance projects in the same manner as the LoanSTAR program by using energy and operational savings as funding for the projects. Performance contractors can package projects with paybacks up to 20 years and pull from a large variety of financial resources for low-interest funding (including the LoanSTAR Program).

For more information on this subject feel free to visit the SECO website or call Jacobs at the number shown on the front cover of this PEA.

APPENDIX A – UTILITY DATA

APPENDIX B – CALCULATIONS

APPENDIX C – COST ESTIMATES

APPENDIX D – SECO SERVICE AGREEMENT

APPENDIX E – SENATE BILL 12 INFORMATION

APPENDIX F – USEFUL WEBSITES